

Remarks

Claim 26 is allowed. Claims 12, 14, 18, 27, 28, 30, 31, 34, and 37 are amended. New claims 38-46 are added. The amended claims and new claims are fully supported by the specification and add no new matter to the application. A marked-up version of the claims showing the changes made is submitted concurrently with this Request for Continued Examination.

Claims 32, 33, and 35 are cancelled without prejudice or disclaimer. Applicants reserve the right to claim the subject matter of these claims in a continuation application.

Claims 12-16, 18-20, 23-31, 34, 36-46 are pending.

Rejections based on 35 U.S.C. § 112, first paragraph

Claims 28-33 and 37 were rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was allegedly not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the invention.

The Examiner rejected claim 28 for the recitation of the phrase "that is not perpendicular." This phrase has been eliminated from the claim.

Referring to claim 29, the Examiner stated that it is unclear as to where this claim is disclosed in the original specification. Applicants respectfully submit that claim 29 is supported by the original specification.

Claim 29 depends on claim 28 and provides that the pollution control element has an oval shaped cross section defined by a larger radius of curvature and a smaller radius of curvature. At least one score-line is located proximate to the smaller radius of curvature and no score-line is located proximate to the larger radius of curvature.

The first paragraph of page 5 of the specification supports claim 29.

"As seem more clearly in Figures 3A and 3B, score-lines 24 adjacent each end of sheet material 22 extend transversely and in parallel across the width and perpendicular to the length of the sheet material 22. Figure 3B illustrates a sheet material 22 surrounding an oval shaped monolith 18 and demonstrates how score-lines 24 relieve surface tension in the sheet. In this embodiment, score-lines 24 are preferably placed in the top surface 23 of the sheet material 22 at the point or

within the area of the surface which corresponds to the smallest radius of curvature 13 of the monolith when the sheet material is wrapped around the monolith. As shown in Figure 3B, score-lines 24 provide openings 26 in the sheet material 22 that are predicable in location, depth and width. Predictable openings are advantageous because they can be taken into account when designing the housing for the catalytic converter. For example, since the openings in the sheet materials are predictable, a single converter housing design could be used to prevent the by-passing of polluting exhaust gases through the predictable openings and the housings can be easily reproduced in the quantity desired."

Figure 3B shows an oval shaped pollution control element having a larger and smaller radius of curvature. There are score-lines only in the area of the sheet material adjacent to the smaller radius of curvature. That is, there are no score-lines in the area of the sheet material adjacent to the larger radius of curvature.

Claim 29 is further supported by Figures 4A and 4B that include two score-lines in the sheet material proximate a smaller radius of curvature of the pollution control element and no score-lines in the area of the sheet material adjacent to the larger radius of curvature of the pollution control element. Claim 29 is still further supported by Figures 5A and 5B that include 3 score-lines in the sheet material proximate a smaller radius of curvature of the pollution control element and no score-lines in the area of the sheet material adjacent to the larger radius of curvature of the pollution control element. Figures 4A, 4B, 5A, and 5B are described on page 5, lines 16-28 of the specification.

Claim 29 is in full compliance with 35 U.S.C. § 112, first paragraph. Applicants request withdrawal of the rejection based on this claim.

The Examiner alleges that claim 31 is not disclosed in the original specification. Applicants respectfully submit that amended claim 31 is fully supported by the specification.

Claim 31 provides that the score-line has a cross-sectional shape selected from a vertical line-shape, a V-shape, a U-shape, a triangular shape, or a square shape. The claim is supported at page 9, lines 15-21 of the application.

Claim 31 is in full compliance with 35 U.S.C. § 112, first paragraph. Applicants request withdrawal of the rejection based on this claim.

The rejection based on claim 32 is moot because this claim has been cancelled.

Rejections based on 35 U.S.C. § 112, second paragraph

Claims 12-16, 18-20, 23-25, 27, and 32 were rejected based on 35 U.S.C. §112, second paragraph as being indefinite. Applicants submit that the pending claims are definite.

The Examiner rejected claim 12 for the recitation of the term "undesirable." This term has been removed from the claim. Claim 12 is definite and Applicants request withdrawal of the rejection based on this claim.

The Examiner rejected claim 28 for the recitation of the phrase "not perpendicular." This phrase has been removed from the claim. Claim 28 is definite and Applicants request withdrawal of the rejection based on this claim.

Regarding claim 29, the Examiner stated that it is unclear as to where it is disclosed in the specification that no score-line is located proximate to said larger radius of curvature. Applicants submit that claim 29 is definite and supported by Figures 3A, 3B, 4A, 4B, 5A and 5B. These figures show that the score-lines are located in the area of the sheet material that is adjacent to the smaller radius of curvature of the oval shaped pollution control element. There are no score-lines in the areas of the sheet material that are adjacent to the larger radius of curvature of the pollution control element.

Claim 29 is definite and Applicants respectfully request withdrawal of the rejection based on this claim.

The Examiner alleged the structural limitations in claim 30 are not clear. The claim has been amended to recite that two larger radiuses of curvatures that are separated from each other by two smaller radiuses of curvatures define the oval shaped cross section of the pollution control device. The claim provides that the sheet material has at least one score-line located proximate to each of the smaller radius of curvatures and no score-line located proximate to either of the larger radius of curvatures.

Claim 30 is definite and Applicants request withdrawal of the rejection based on this claim.

The Examiner alleged that the phrase "without removing any of said sheet material" in claims 31 and 37 is not disclosed in the original specification. These claims have been amended to recite that the score-line has a cross-sectional shape selected from a vertical line shape, a V-shape, a U-shape, a triangular shape, and a square shape. This amendment is supported on page 9, lines 15-21 of the specification. The figures provide additional support for score-lines having a cross-sectional shape that has a vertical line shape or a V-shape.

Claims 31 and 37 are definite and Applicants request withdrawal of the rejections based on these claims.

The rejections based on claims 32 and 33 are moot because these claims have been removed from the application.

Rejections based on 35 U.S.C. § 103(a) over JP 61-89916

Claims 12-16, 18-19, 23-25, 27, 32, and 34-37 were rejected as obvious over JP 61-89916 (hereinafter "JP '916"). Applicants submit that the pending claims are not obvious.

JP '916 discloses a pollution control device having a sheet material disposed between the housing and the pollution control device. The sheet material has a plurality of score lines on the top and bottom surfaces. The Examiner stated that "the score lines are disposed across the longer direction of the sheet material which appears to be the direction of the gas flowing (Fig. 2) and therefore meets the instant claim." (see page 4 of office action). The Examiner concluded that even if it is not, then it would have been obvious to one having ordinary skill in the art to select an appropriate direction for the score lines, such as parallel to the flow of gas.

JP '916 unambiguously teaches in the second full paragraph on page 4 of the translation that the "continuous concaves 1a are formed on both sides of the seal-mat 1 in the length direction." The concave cuts run along the length of the sheet material and around the circumference of the pollution control element. The sheet material is positioned around the pollution control element so that the concave cuttings are perpendicular to the flow of gas through the pollution control device. By having the sheet material positioned so that the concave cuttings are perpendicular the flow of gas, the sheet material can function to prevent gas from bypassing the pollution control device.

Independent claims 12 and 34 provide that the sheet material functions to prevent exhaust gas from by passing the pollution control device. The claims also provide that the score-lines go across the entire width of the sheet material; that is, the score-lines are in the direction of gas flow through the pollution control device. These claim features are not taught or suggested by JP '916.

JP '916 provides no disclosure for positioning the concave cuttings across the width of the sheet material. Concave cutting positioned across the width would be in the same direction as gas flowing through the pollution control device.

The sheet material disclosed in JP '916 would be less likely to prevent gas from bypassing the pollution control device if the concave cuttings on both the top and bottom surfaces of the sheet material were positioned in the direction of the gas flow through the device. That is, if the concave cuttings were positioned along the width rather than along the length of the sheet material, exhaust gas could more easily flow through the spacing between the housing and the sheet material or through the spacing between the sheet material and the pollution control element.

MPEP §2143.01 provides that the proposed modification (i.e., rotating the concave cuttings of the sheet material from being perpendicular to the gas flow to being in the direction of the gas flow) cannot render the prior art unsatisfactory for its intended purpose. If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 UPQ 1125 (Fed. Cir. 1994).

Thus, JP '916 provides no motivation for providing score-lines that correspond with the direction of gas flow through the pollution control element (i.e., across the width of the sheet material) because the sheet material would be less likely to prevent exhaust gas from bypassing the pollution control device. To function as a pollution control device, the sheet material needs to form a seal.

Having the score-line across the width (e.g., as in claims 12 and 34 of the present invention) rather than the length of the sheet material allows the surface tension of the sheet disposed around the pollution control device to be reduced compared to an identical sheet material without the score-lines across the width. This structural feature can prevent cracking or breaking of the sheet material.

The pollution control element can have an oval shape. The surface tension of a sheet wrapped around an oval shaped pollution control element would not be reduced by forming score-lines along the length of the sheet but can be reduced by forming score-lines along the width of the sheet. The concave cuts are less likely to reduce the surface tension of the sheet material when directed across the length as disclosed in JP '916 rather than the width of the sheet material.

Both independent claims 12 and 34 provide that the surface tension of the sheet disposed around the pollution control element is reduced by the presence of the score-lines across the width of the sheet material. JP '916 is devoid of any teaching or suggestion that the sheet material can have a reduced surface tension when disposed around a pollution control element by forming score-lines across the width rather than the length of the sheet material.

Independent claims 12 and 34 are not obvious over JP '916. Because dependent claims 13-16, 18-19, 23-25, 27, 32, and 36-37 are dependent from either claim 12 or claim 34, these dependent claims are not obvious for at least the same reasons. Applicants respectfully request withdrawal of the obviousness rejection based on JP '916.

Rejections based on 35 U.S.C. § 103(a) over JP 61-89916 in view of JP 2-61313

The Examiner rejected claims 16, 19-20, and 23 as being obvious over JP 61-89916 in view of JP 2-61313. Applicants submit that the pending claims are not obvious over the combination of these references.

Claims 16, 19-20, and 23 are dependent on claim 12. Thus, these claims are not obvious based on JP '916 for at least the same reasons given above for claim 12.

JP 2-61313 (hereinafter "JP '313") does not overcome the deficiencies noted for JP '916. JP '313 provides a sheet material that is disposed around a pollution control device. The sheet material has grooves formed on a surface that faces the pollution control device. The grooves do not extend across the entire width as recited in independent claim 12.

The sheet material disclosed in JP '313 is unlikely to reduce the surface tension of the sheet disposed around the pollution control device because the grooves are not formed across the entire width of the sheet material. Further, there is no teaching or suggestion that the groove lines can be extended across the entire width of the sheet material.

The combination of JP '313 and JP '916 fails to teach or suggest score-lines formed across the entire width of the sheet material. The combination fails to teach or suggest that the sheet material has a reduced surface tension when disposed around the pollution control element because of a score-line directed across the entire width of the sheet material. The surface tension reduction is manifested in less cracking or breaking of the sheet material. The surface tension also allows a shorter length of sheet material to be used to wrap the pollution control device (see page 11, line 18 to page 12, line 16).

Rejection based on 35 U.S.C. § 103(a) over JP 61-89916 in view of U.S. Patent No. 5,332,609

The Examiner rejected claims 28-31 and 33 as obvious over JP '916 in view of U.S. Patent No. 5, 332,606 (hereinafter US '606) issued to Corn. Applicants submit that the pending claims are not obvious over the combination of JP '916 and US '606.

Claim 28 provides that the score-lines extend across the width of the sheet material in a direction that is parallel to gas flow through the pollution control device. The score-line relieves surface tension in the sheet material that would be generated if the sheet material were disposed around the pollution control device in the absence of the score-line.

JP '916 provides no teaching or suggestion that the score-lines extend across the width of the sheet material in a direction that is parallel to gas flow through the pollution control device. To the contrary, the sheet material disclosed in JP '916 has concave cuts that are positioned in the direction of the length of the sheet material and around the circumference of the pollution control element. There is no teaching or suggestion for modifying the teachings of this reference to position the concave cuts across the width of the sheet material. One of skill in the art would not be motivated to rotate the concave cuts to be directed along the width of the sheet because the sheet material is less likely to function as a seal when rotated.

JP '916 provides no teaching or suggestion for lowering the surface tension of the sheet material by forming score-lines along the width of the sheet material. Forming score-lines that are positioned around the circumference of the pollution control device as in JP '916 are less likely to reduce the surface tension compared to score-lines directed across the width of the sheet material as recited in independent claim 28 of the present invention. Thus, independent claim 28 is not obvious over JP '916.

US '609 does not overcome the deficiencies of JP '916. This reference disclosed a two-layer mounting sheet that is devoid of any score-lines, let alone score-lines that extend in a direction parallel to the gas flow through the pollution control device. Thus, the combination of references fails to teach several limitations included in claim 28 of the present invention.

Claim 28 is not obvious over the combination of JP '916 and US '609. Applicants respectfully request that the obviousness rejection based the combination of these references be withdrawn.

Claims 29-31 of the present invention are not obvious over JP '916 in view of US '609. These claims provides that the pollution control element has an oval shaped cross-section defined by a larger radius of curvature and a smaller radius of curvature. One or more score lines are located proximate to the smaller radius of curvature and no score-line is located proximate the larger radius of curvature.

Claims 29-31 are dependent on claim 28 and are not obvious for at least the same reasons stated for claim 28. Additionally, the combination of JP '916 and US '609 provides no teachings about having score-lines in only selected regions of the sheet material such as proximate the smaller radius of curvature of the sheet material around the pollution control element. JP '916 disclosed a sheet material having concave cuts across both the top and bottom surfaces of the entire sheet material are regular intervals. There is no suggestion that the concave cuts could be formed in only selected areas of the sheet material. US '609 provides no teaching about score-lines, let alone score-lines in selected areas of the sheet material. The references provide to motivation to form the score-lines proximate the small radius of curvature but not proximate the larger radius of curvature.

Thus, claims 29-31 are not obvious over the combination of JP '916 and US '609. Applicants respectfully request withdrawal of the obviousness rejection based on the combination of these references.

The rejection with regard to claim 33 is moot because this claim has been cancelled from the application.

Rejection based on U.S.C. § 103(a) over JP 2-61313 in view of JP 61-89916

The Examiner rejected claims 12-16, 18-20, 23-25, 27, 32, and 34-37 over JP '313 in view of JP '916. Applicants submit that the pending claims are not obvious over the combination of these references.

JP '313 fails to teach or suggest that score-lines are formed across the entire width of the sheet material as recited in claim 12 of the present invention. The sheet material disclosed in JP '313 is unlikely to reduce the surface tension of the sheet disposed around the pollution control device because the grooves are not formed across the entire width of the sheet material. Further, there is no teaching or suggestion that the groove lines can be extended across the entire width of the sheet material.

JP '916 does not remove the deficiencies of JP '313. The combination of references does not teach score-lines formed across the entire width of the sheet material. Rather, JP '916 teaches that the score-lines are directed along the length of the sheet material. The score-lines disclosed in either reference are not likely to reduce the surface tension of the sheet material wrapped around a pollution control device. As such, these references provide no teaching that cracks or breaks can be reduced by forming score-lines across the entire width of the sheet material.

The combination of JP '916 and JP '313 provides no suggestion or motivation for score-lines directed across the entire width of the sheet. As noted in the discussion for JP '916 above with regard to claim 12, one of skill in the art would not be motivated to position the concave cuts along the width rather than the length of the sheet material because the sheet material would be less likely to form a seal around the pollution control device.

Thus, claim 12 is not obvious over JP '313 in view of JP '916. For at least the same reason, dependent claims 13-16, 18-20, 23-25, and 27 are not obvious over the combination of these references. Applicants respectfully request withdrawal of the obviousness rejection based on these claims.

The rejection with respect to claim 32 is moot because this claim has been cancelled from the application.

JP '313 discloses that the grooves are formed on the surface of the sheet that is facing the pollution control device. In contrast, claim 34 of the present invention provides that the score-lines are formed on the top surface of the sheet material, the surface of the sheet material that is facing the housing. JP '313 provides no teaching or suggestion that the grooves could be placed on the other surface of the sheet material.

JP '313 teaches that the alteration of the sheet material surface facing the pollution control device by the formation of grooves on a sheet surface has the effect of increasing the friction between the pollution control device and the sheet material. There is no teaching or suggestion that the same improvement would be noted by modifying the invention to provide grooves on the other surface of the sheet material (i.e., the surface facing the housing). The reference provides no motivation to position the grooves on the surface of the sheet material facing the housing as recited in independent claim 34.

Although JP '916 teaches forming score-lines on the top surface of the sheet material, the concave cuts are directed across the length rather than the width of the sheet material. As such, the concave cuts are not in a direction parallel to the gas flow through the pollution control device. As discussed above, JP '916 provides no motivation for providing score-lines along the width of the sheet material.

Claim 34 is not obvious over the combination of JP '313 and JP '916. For at least the same reasons, dependent claims 35-37 are not obvious over this combination of references. Applicants respectfully request withdrawal of the rejection of these claims as being obvious over JP '313 in view of JP '916.

Rejection based on 35 U.S.C. § 103(a) over JP 2-61313 in view of JP 61-89916 and U.S. Patent No. 5,332,609

The Examiner rejected claims 28-31 and 33 as obvious over JP '313 in view of JP '916 and US '609. Applicants respectfully submit that the pending claims are not obvious over this combination of references.

JP '313 discloses that the grooves are formed on the surface of the sheet that is facing the pollution control device. In contrast, claim 28 of the present invention provides that the score-lines are formed on the top surface of the sheet material, the surface of the sheet material that is

facing the housing. JP '313 provides no teaching or suggestion that the grooves could be placed on the other surface of the sheet material.

JP '313 teaches that the alteration of the sheet material surface facing the pollution control device by the formation of grooves on a sheet surface has the effect of increasing the friction between the pollution control device and the sheet material. There is no teaching or suggestion that the same improvement would be noted by modifying the invention to provide grooves on the other surface of the sheet material (i.e., the surface facing the housing). The reference provides no motivation to position the grooves on the surface of the sheet material facing the housing as recited in independent claim 28.

Although JP '916 teaches forming score-lines on the top surface of the sheet material, the concave cuts are directed across the length rather than the width of the sheet material. As such, the concave cuts are not along the width of the sheet material in a direction parallel to the gas flow through the pollution control device. As discussed above, JP '916 provides no motivation for providing score-lines along the width of the sheet material.

US '609 provides no teaching about score-lines, much less those formed on the top surface of the sheet material facing the housing or positioned across the width of the sheet material.

Claim 28 is not obvious over the combination of JP '313, JP '916, and US '609. Applicants respectfully request removal of the obviousness rejection based on the combination of these references.

Claims 29-31 are dependent on claim 28 and are not obvious for at least the same reasons stated for claim 28. Additionally, the combination of JP '313, JP '916, and US '609 provides no teachings about having score-lines in only selected regions of the sheet such as proximate the smaller radius of curvature of the sheet material around the pollution control element. JP '916 teaches having concave cuts across the entire sheet at regular intervals. JP '313 teaches grooves across the bottom surface at regular intervals. US '609 provides no disclosure regarding score-lines, much less the periodicity of such score-lines. There is no suggestion or teaching that the concave cuts could be formed in only selected areas of the sheet material.

Thus, claims 29-31 are not obvious over the combination of JP '313, JP '916, and US '609. Applicants respectfully request withdrawal of the obviousness rejection based on the combination of these references.

Applicants submit that the pending claims 2-16, 18-20, 23-31, 34, and 36-46 are in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

November 5, 2002
Date

By: Jean A. Lown
Jean A. Lown, Reg. No.: 48,428
Telephone No.: 651-733-3169

Office of Intellectual Property Counsel
3M Innovative Properties Company
P.O. Box 33427
St. Paul, MN 55133-3427
Facsimile No.: 651-736-3833

Version with Markings to Show Changes Made

12. (Four times amended) A pollution control device comprising:

a housing;

a pollution control element having an outer curvature and being disposed within said housing; and

a mounting article disposed between said pollution control element and said housing, said mounting article comprising a sheet material useful for mounting said pollution control element and preventing exhaust gas from bypassing the pollution control element, said sheet material having major top and bottom surfaces, a thickness, a length, and a width corresponding to a direction of exhaust gas through the device, said sheet material having at least one score-line in the major top surface and across the entire width of said sheet material to relieve enough surface tension in said sheet material that, when said sheet material is disposed around the curvature of said pollution control element, [undesirable] cracking or breaking of said sheet material that would otherwise occur is avoided.

14. (Twice amended) The pollution control device of claim 13 wherein each of said score-lines extend across the entire width of the top surface of said sheet material and the top surface of the sheet material faces the housing.

18. (Twice amended) The pollution control device of claim 12 wherein said sheet material has at least one score-line in the major bottom surface and across the width of said sheet material, wherein the score-line on the bottom surface have a cross-sectional shape that is V-shaped and the score-lines on the top surface have a cross-sectional shape that is a vertical line.

27. (Once Amended) The pollution control device of claim 12 wherein said score-lines [are U-shaped] have a cross-sectional shape selected from a vertical line shape, a V-shape, a U-shape, a triangular shape, and a square shape.

28. (Twice amended) A pollution control device comprising:

a housing;

a pollution control element [having a curvature and being] disposed within said housing; and

a mounting article disposed between said the pollution control element and said housing, said mounting article comprising a sheet material useful for mounting said pollution control element and preventing exhaust gas from bypassing the pollution control element, said sheet material having a major top surface facing said housing and a major bottom surface facing said pollution control element, a thickness, a length and a width, said sheet material having at least one score-line [located proximate said radius of curvature and] extending across the width of the sheet material in a direction that is [not perpendicular] parallel to gas flow through said pollution control element, said at least one score-line relieving surface tension in said sheet material that would have been generated by said sheet material being disposed around [the radius of curvature of] said pollution control element if not for said at least one score-line.

30. (Once Amended) The pollution control device of claim 29 wherein the oval shaped cross section of said pollution control device is defined by two larger radius of curvatures that are separated from each other by two smaller radius of curvatures and said sheet material has [at least one score-line includes] at least one score-line located proximate to each of said smaller radius of curvature and no score-line is located proximate to either of said larger radius of curvatures.

31. (Once Amended) The pollution control device of claim 28 wherein said at least one score-line [is a cut into said sheet material that is formed without removing any of said sheet material] has a cross-sectional shape selected from a vertical line shape, a V-shape, a U-shape, a triangular shape, and a square shape.

34. (Once Amended) A mounting article for mounting a pollution control element within a pollution control device, said mounting article comprising a sheet material useful for mounting a pollution control element in a housing, where the pollution control element has an outer curved surface, said sheet material having

a major top surface facing the housing and a major bottom surface facing the pollution control device,

a thickness,

a length dimensioned so as to allow said sheet material to be wrapped lengthwise completely around the outer curved surface of the pollution control element and form a seal between the pollution control element and the housing, wherein the seal prevent gas from bypassing the pollution control element,

a width that is smaller than the length, and

at least one score-line formed in at least the major top surface of said sheet material, each score-line being disposed across the entire width of said sheet material.

37. (Once Amended) The pollution control device of claim 34 wherein said at least one score-line [is a cut into said sheet material that is formed without removing any of said sheet material] has a cross-sectional shape selected from a vertical line shape, a V-shape, a U-shape, a triangular shape, and a square shape.

Add new claims 38-46.